

Appl. No. 10/050,373

REMARKS

Claim 11 is amended; new claims 48 and 49 are added; and claims 11-19, 48 and 49 are pending in the application.

Claims 11-19 stand rejected as being unpatentable over Aronowitz. Applicant has amended claim 11, from which claims 12-19 depend, and believes that such amendment places claims 11-19 in condition for allowance. Applicant's amendment to claim 11 modifies the claim so that a recited thermal annealing comprises rapid thermal processing at a ramp rate of at least about 50° C/sec to a process temperature of less than 1,000° C, with the process temperature being maintained for at least about 30 seconds. The Examiner's cited reference does not disclose or suggest any process where a nitrogen-enriched region is thermally annealed under the conditions recited in claim 11. For at least this reason, claim 11 is believed allowable over the cited reference, and Applicant therefore requests full allowance of claim 11 in the Examiner's next action.

Claims 12-19 depend from claim 11, and are therefore allowable for at least the reasons discussed above regarding claim 11. Applicant therefore requests formal allowance of claims 12-19 in the Examiner's next action.

New claims 48 and 49 are also believed allowable. Claims 48 and 49 are supported by the originally-filed claim 11, together with annealing conditions described in the originally-filed specification at, for example, page 6, lines 17-21. New claims 48 and 49 are therefore supported by the originally-filed application, and do not comprise "new matter". Claims 48 and 49 are believed allowable over the cited reference for at

Appl. No. 10/050,373

least the reason that the reference does not disclose or suggest the specific thermal anneal conditions recited in claims 48 and 49.

Claims 11-19 are allowable for the reasons discussed above, and new claims 48 and 49 are believed allowable. Applicant therefore requests formal allowance of claims 11-19, 48 and 49 in the Examiner's next action.

Respectfully submitted,

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By:

  
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Application Serial No. ....10/050,373  
Filing Date .....January 15, 2002  
Inventor..... Gurtej S. Sandhu et al.  
Assignee .....Micron Technology, Inc.  
Group Art Unit.....2813  
Examiner .....Schillinger, L.  
Attorney's Docket No. ....MI22-1896  
Title: Methods of Forming a Nitrogen Enriched Region

VERSION WITH MARKINGS TO SHOW CHANGES MADE ACCOMPANYING  
RESPONSE TO OCTOBER 4, 2002 OFFICE ACTION

In the Claims

The claims have been amended as follows. Underlines indicate insertions and ~~strikeouts~~ indicate deletions.

11. (Amended) A method of forming a nitrogen-enriched region within a silicon-oxide-containing layer, comprising:

providing the silicon-oxide-containing layer over a substrate; the layer having an upper surface above the substrate and a lower surface on the substrate;

exposing the layer to activated nitrogen species from a nitrogen-containing plasma to introduce nitrogen into the layer and form a nitrogen-enriched region, the nitrogen enriched region being only in an upper half of the silicon-oxide-containing layer; and

thermally annealing the nitrogen within the nitrogen-enriched region to bond at least some of the nitrogen to silicon proximate the nitrogen; the nitrogen-enriched region remaining confined to the upper half of the silicon-oxide-containing layer during the annealing; the thermal annealing comprising either ~~(1) thermal processing at a~~

Appl. No. 10/050,373

~~temperature of less than 1100°C for a time of at least 3 seconds, or (2) rapid thermal processing at a ramp rate of at least about 50°C/sec to a process temperature of less than 1000°C, with the process temperature being maintained for at least about 30 seconds.~~

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